

## **Biometric Identity Management System**

In February 2015, UNHCR completed development of its new biometric identity management system (BIMS), building on the successful use of biometrics across a number of UNHCR operations globally. When fully rolled out, **BIMS will support all standard registration activities and help to better register and protect people, verify their identity and target assistance for the forcibly displaced in operations around the world.**



**UNHCR**

**United Nations High Commissioner for Refugees**  
Haut Commissariat des Nations Unies pour les réfugiés

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## Agenda



**INTERNATIONAL BIOMETRIC  
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Evaluation and Performance of Biometric Technologies



**May 3 – 5, 2016: Gaithersburg, MD**

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- Project Overview
- Solution Overview
- Operations
- High-level Architecture
- Metrics
- What's Next

### Project goals:

- Introduction of a global biometric enrolment and verification solution for the purpose of:
  - Equitable distribution of benefits (ration)
  - Move away from paper-based system where identity documents can be lost
  - Reduce fraud
- Usage must be possible in urban centers as well as in field environments
- Scope: capture, enrolment and verification of the biometric data of the entire refugee population across disparate locations

### Key requirements:

- Modular system design
- Rugged, Fast, accurate, effective, non-invasive, intuitive
- Scalable and extensible
- Non-proprietary and vendor agnostic

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## Overview

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### Supported functions:

- Enrollment
- Identification and Verification
- Deduplication and resolution of adjudication cases
- Administration portal (User Administration, Roles and Permissions, Synchronization configuration)
- Reporting
- System Monitoring
- Simple License Management

### Project scope:

- Customization, Configuration, Integration
- Client training (train-the-trainer)
- Customized training materials and user documentation
- Client administrator training and documentation
- UAT environment setup
- Transition to Support and Maintenance

### Integration and Customization timeline:

- 5 months for customization, User Acceptance Test and Deployment
- 1 month for the field Site Acceptance Test

Pilot



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## *BIMS – Biometric Capture*



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## *BIMS Operations – Fingerprint Capture*



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## *BIMS Operations – Iris Capture*



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## *BIMS Operations - Thailand*



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## BIMS - Login




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Biometric Identity Management System

5 Location: Bratislava

 LOGIN


Operator

Operator ID



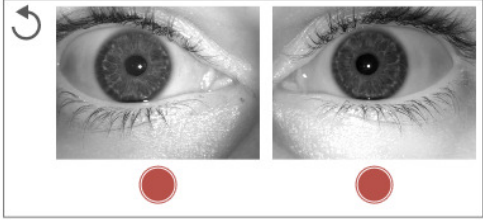
Live Feed

Fingerprint




Capture Mode:

Iris



Few fingers

 Login Connection status: Connected

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## BIMS - Enrollment



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Biometric Identity Management System

25 Location: Bratislava

ENROLLMENT - Biometric Capture

Home

Person to be enrolled

BirthDate : 4/6/1975

Fullname : Angelina Jolie

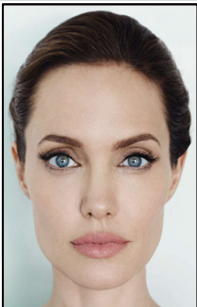
Name : Angelina

Surname : Jolie

BiometricId

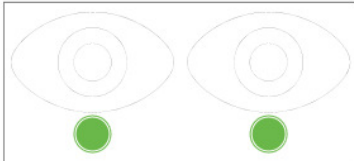
Last Encounter Place:

Last Encounter Date:

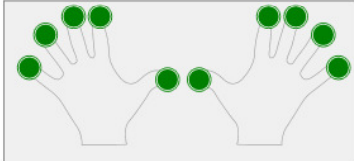


Capture

Iris



Fingerprint

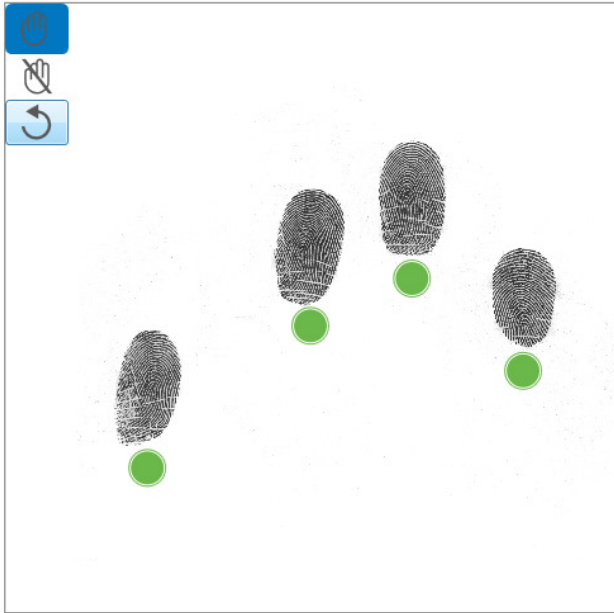


Face

Capture >



Live feed

Fingerprint



Capture Mode: 4-1-4-1 >

Photo is required.

Operator ID: nina.pross   Connection status: Connected

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## BIMS - Adjudication



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**Biometric Identity Management System**

Location: Geneva

**ADJUDICATION**

**Filter**

**Date**  
 From: 17.12.2014  
 To: 21.12.2014

**Status**  
☒ Open  
☒ Closed  
☒ Processing  
☒ Pending

**Type**  
☐ Deduplication\_Case  
☐ False\_Linkage  
☐ False\_Match  
☐ False\_Non\_Match

**Location**  
 Slovakia - Bratislava  
 Switzerland - Geneva  
 Malawi - Malawi

**Filter Result Number**

Date	Status	Type	Adjudication Number	Last Update
12/21/2014	Closed	False_Match	000200125	12/21/2014
12/21/2014	Processing	False_Linkage	000200126	12/21/2014
12/21/2014	Closed	False_Match	000200127	12/21/2014
12/21/2014	Closed	False_Match	000200128	12/21/2014
12/21/2014	Open	False_Match	000200129	12/21/2014
12/21/2014	Open	False_Match	000200130	12/21/2014
12/21/2014	Processing	False_Linkage	000200131	12/21/2014
12/21/2014	Closed	False_Linkage	000200132	12/21/2014
12/21/2014	Open	False_Linkage	000200133	12/21/2014
12/21/2014	Closed	False_Non_Match	000200134	12/21/2014
12/21/2014	Closed	False_Non_Match	000200135	12/21/2014
12/21/2014	Open	False_Non_Match	000200136	12/21/2014

Operator ID: nina.pross
 Connection status: Connected

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The UN Refugee Agency
Location: Bratislava

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→ **ADJUDICATION - False Match**
Case List

Case: 000200128
Last update: 12/21/2014 1:16:09 PM

### POC in the system

000200133  
845-00001590

Quality	
93	
76.16	
63.21	
65.84	
72.36	
77	
73	
73	
69	
78	
n/a	
n/a	

Biometric ID

### POC to be enrolled

Quality	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	
n/a	

**RESOLUTION DIALOG**

- ☐ Biometric captured are of bad quality
- ☒ Different - No apparent reason for matching
- ☐ Different - Recapture already enrolled PoC's Biometric

Notes:

Save decision
Submit decision
Cancel

Same Person
Different Person
I don't know yet

Notes

Operator ID: nina.pross

Connection status: Connected

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## BIMS - Architecture

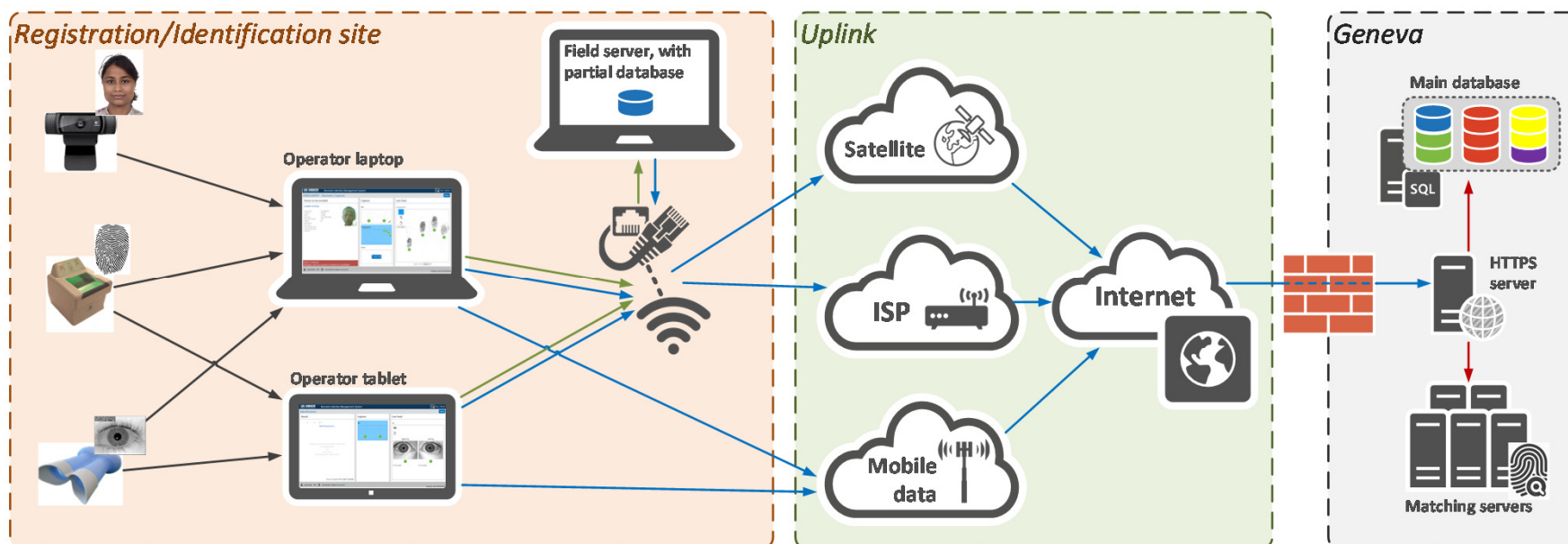
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### BIMS Capture Devices

- 10 fingerprint images
- 2 iris images
- 1 facial image

### BIMS Local Server

- Creates biometric templates
- Matches with local database to ensure no duplicates
- Queues enrolment for submission to Central System



### BIMS Central Server

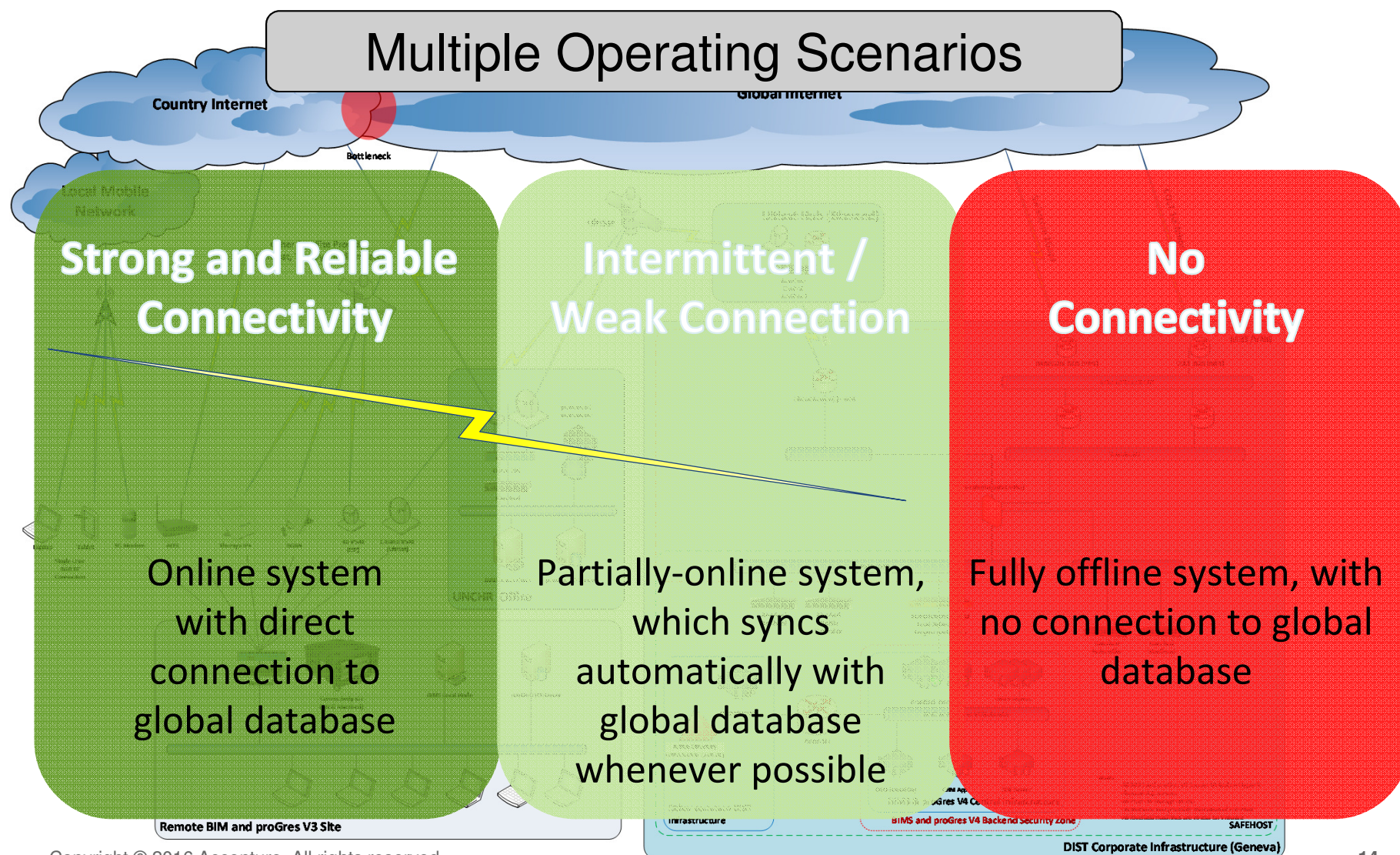
- Accepts enrolment package from BIMS Local Server
- De-duplicates enrolment with global gallery of biometric records
- Manages adjudication cases (suspected duplicates) and sends cases down to relevant Local BIMS Server



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## BIMS - Architecture

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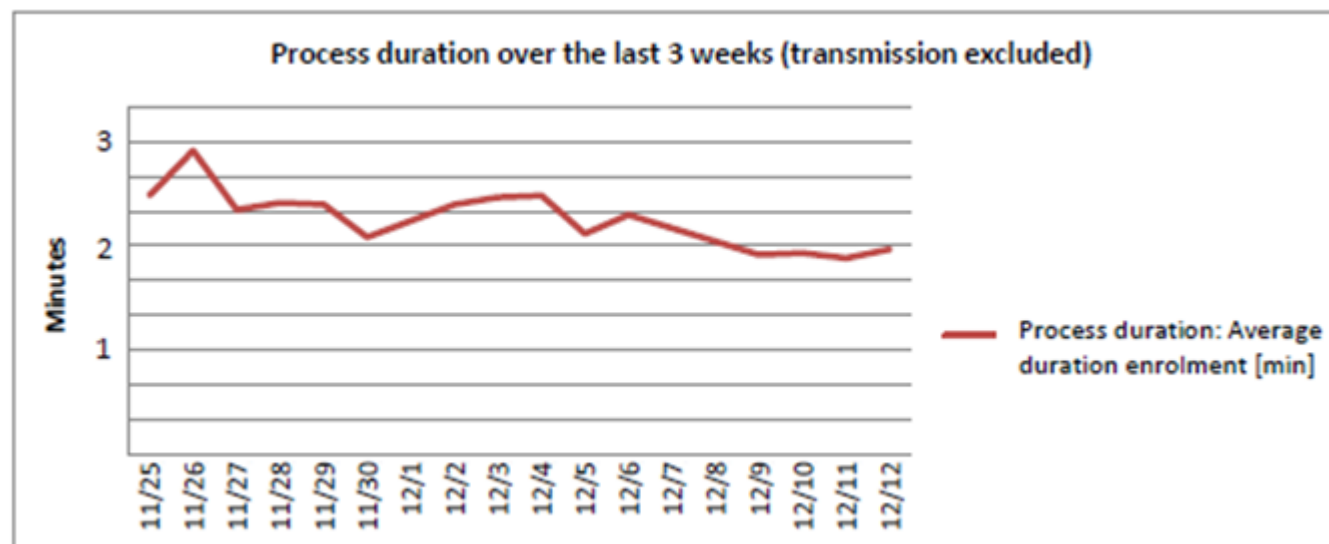


- 16 enrolment stations
- 4 verification stations
- Target average of 1,000 per day
- 16,849 refugees enrolled
- 314 adjudication cases (91% of which were in the 0-3 age range)
- 4 week exercise
- 140 staff

The exercise has proven that iris was the easiest biometric to capture with a recapture attempt only once every 7 enrollees on average and 1 in 5 enrollees had to recapture some fingerprints mostly recapturing a complete slap (4 fingers). Due to the challenging lighting and background, face has proven to be the biometric with the highest recapture rate with an average 2 captures per enrollee to acquire a good face quality image.

Operators stated they were comfortable with the application after only 30 – 60 minutes of operations – after a half-day training session prior to Go-Live.

The average enrolment process lasted 2 minutes 11 seconds, and the average time was reduced to under 2 minutes towards the end of the pilot, as the operators became increasingly proficient with the system.



Of the whole population, 81% could capture good quality fingerprints, 12% low quality and 7% couldn't capture.

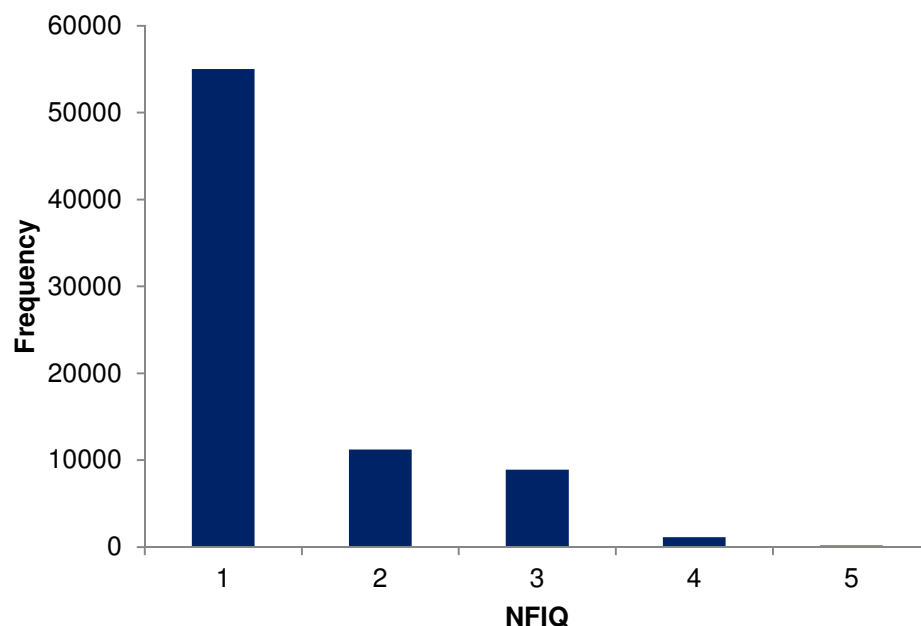
### Ages 4+

- 87% over four 'good' fingerprints
- 12% low quality fingerprints
- 1% no capture

### Ages 0-3

- 2% over four 'good' fingerprints
- 2% low quality fingerprints
- 96% no capture

**Fingerprint quality:** Samples with a NIST Fingerprint Image Quality (NFIQ) score of 1, 2, or 3 are considered 'good' quality.



Taking a sample of 76,000 enrolled identities in production, 98% of the fingerprints were NFIQ 3 or better



Rick Lazarick analyzed the poor quality samples and highlighted that **index fingers** and **thumbs** proved to be the largest percentage of the poor quality samples:

Finger	NFIQ-5	NFIQ-4	5 in %	4 in %
1	14	279	8.4%	24.8%
2	40	91	24.0%	8.1%
3	5	35	3.0%	3.1%
4	8	77	4.8%	6.8%
5	14	47	8.4%	4.2%
6	15	344	9.0%	30.6%
7	32	72	19.2%	6.4%
8	7	63	4.2%	5.6%
9	13	86	7.8%	7.6%
10	19	31	11.4%	2.8%

Index fingers (2,7) have much larger NFIQ=5 proportions  
Thumbs (1,6) have much larger NFIQ=4 proportions.

Of the whole population, 85% could capture good quality irises, 8% could capture one good quality iris, 1% low quality and 6% couldn't capture at all.

### Ages 4+

- 98% at least one 'good' iris
- 1% low quality irises
- 1% no capture

### Ages 0-3

- 14% at least one 'good' irises
- 0.1% low quality irises
- 85.9% no capture

**Iris quality:** Following ISO/IEC 19794-6:2011: focus, contrast, occlusion, Signal to Noise (SNR), saturation, and grey level are assessed to determine quality.

Of the whole population, 85% could capture good quality irises, 8% could capture one good quality iris, 1% low quality and 6% couldn't capture at all.

### Ages 4+

- 79% 'good' face
- 20% low quality face
- 1% no capture

### Ages 0-3

- 57% 'good' face
- 42% low quality face
- 1% no capture

**Face quality:** Following ISO/IEC 19794-5:2011: eye gaze, eyes openness, red eye, exposure, natural skin color, image, focus, hot spots, horizontal and vertical alignment, sharpness, image resolution, plain background, width-height head ratio are assessed to determine quality.

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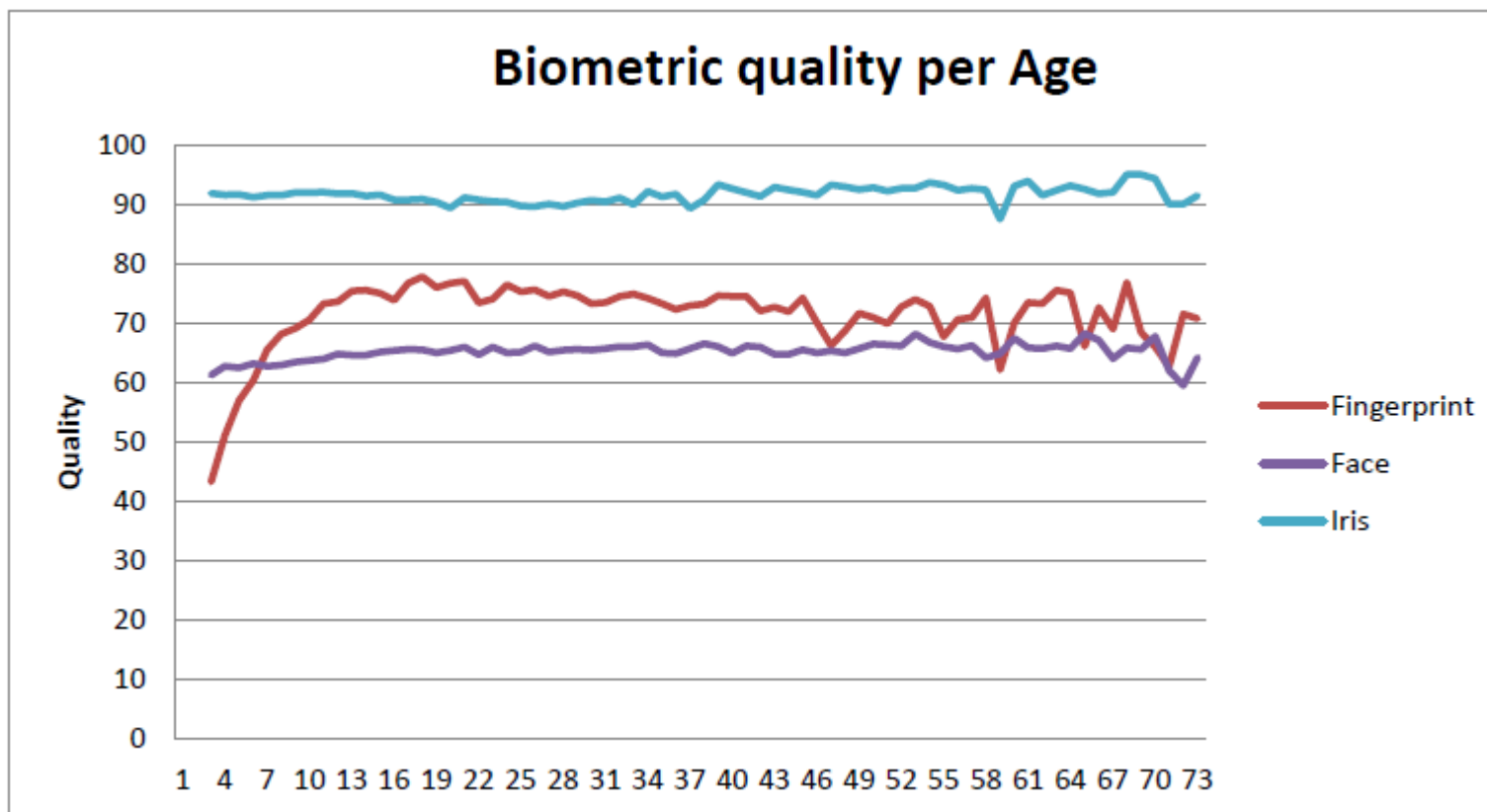
## Pilot Metrics - Age



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**Enrolled population to date: 385,000**

**Enrollment by country:**

- CHAD: **276,000**
- RoC (Congo): **11,000**
- Thailand: **95,000**
- India: **3,000**

**Enrolment Rate (max observed): 3,000/day per location**

**Enrollment Rate (max observed): 5,000/day centrally**



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## What's Next

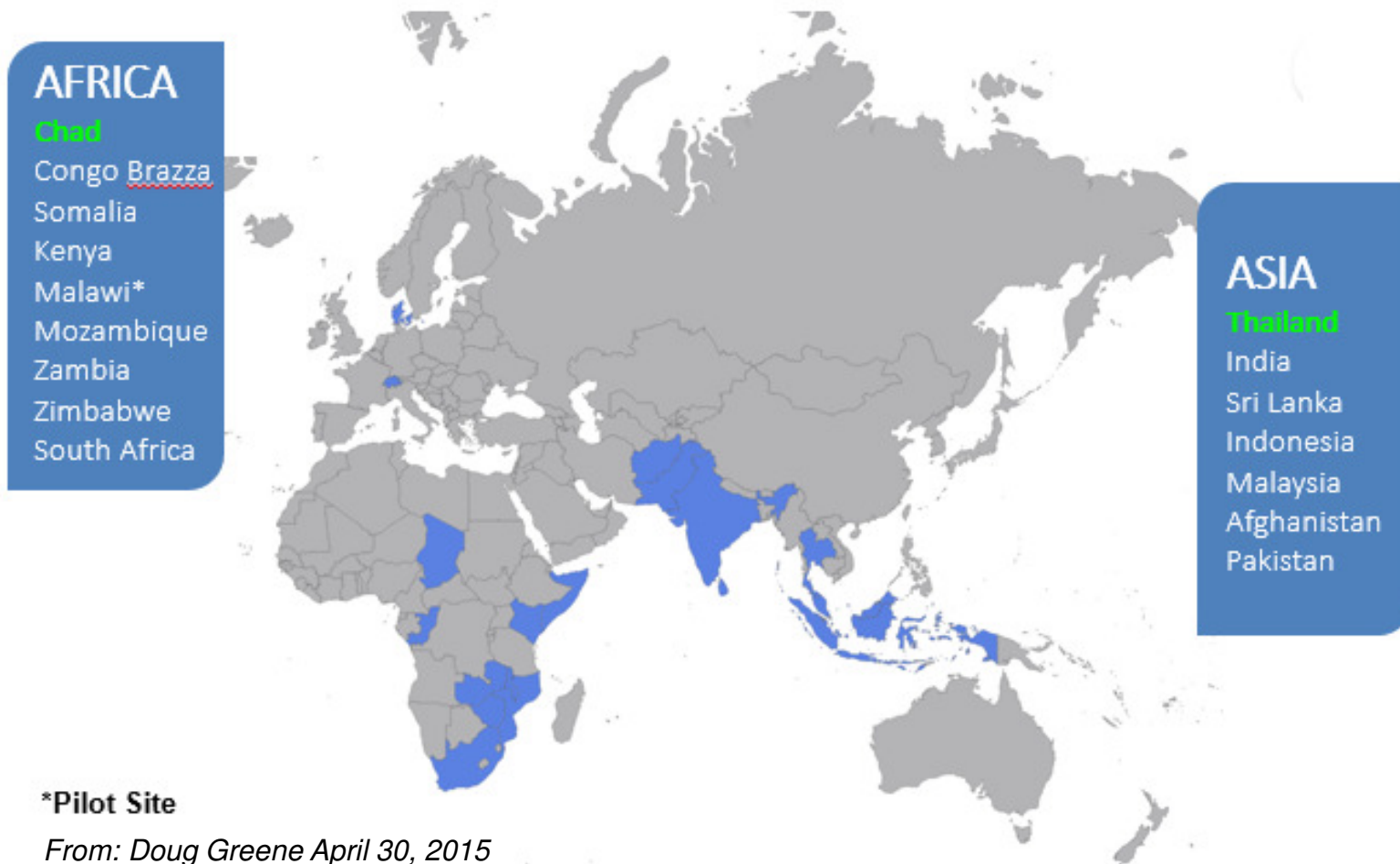


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**Planning is underway with the following UNHCR operations**



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*Thank You*



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